

Application No. 09/894,375

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REMARKS

In the Official Action mailed 1 December 2003, the Examiner reviewed claims 1-8, 10, 13, 14, and 32-34. The Examiner rejected claims 1-8, 10, 13, 14 and 32-34. The Examiner rejected claims 1, 4-7, 10, 13, 14 and 32-34 under 35 U.S.C. 103(a) as being unpatentable over Nanis (U.S. Pat. 5,405,646) in view of Suenaga et al. (U.S. Pat. 5,478,657); rejected claim 3 under 35 U.S.C. 103(a) as being upatentable over Nanis in view of Suenaga et al, and further in view of Ross et al. (U.S. Pat. 5,980,997); and rejected claims 1, 2 and 8 under 35 U.S.C. 103(a) as being unpatentable over Nanis in view of Ishitobi et al. (U.S. Pat. 6,152,976).

Applicant thanks the Examiner for the telephonic interview on 28 January 2004, in which we discussed the Nanis and Suenaga et al. references, and proposed amendments to the claims.

Applicant has amended claims 1, 2, 5, 6, 10, 33 and 34, canceled claim 32, and added new claim 35. Claims 1-14 and 33-35 are now pending. Each of the Examiner's rejections is respectfully traversed below.

Rejection of Claims 1, 4-7, 10, 13, 14 and 32-34 under 35 U.S.C. 103(a)

Claims 1, 4-7, 10, 13, 14 and 32-34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanis (U.S. Pat. 5,405,646) in view of Suenaga et al. (U.S. Pat. 5,478,657).

Applicant has amended claim 1 to require a starting metal substrate with a cold worked surface having an average surface roughness of less than 30 Angstroms. Claim 1 is further amended to recite a deposited layer of nickel alloy, which has a surface roughness upon completion of the electroless plating step that is essentially unchanged from that of the cold worked surface of the substrate. Support for these amendments is found for example at pages 14-15 of the specification. See, in particular page 15, lines 12-15.

Claim 32 is canceled as its subject matter is added to claim 1.

The Nanis reference, our inventor's own prior patent, fails to mention the carpeting effect caused by the plating directly on the surface of a cold-worked metal substrate. Cold-worked metals yield and smear to form a surface layer of distorted crystal structure, which is sometimes known as the Beilby layer, during the cold-working process. The prior Nanis patent does not suggest that the techniques described therein could be applied to mask the Beilby layer. Rather, the process is proposed as a way to promote use of "less expensive alloy grades ..." as the substrate. See, column 6, lines 53-62. The super smooth, cold-worked metal substrates of the

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present invention are not the "less expensive alloy grades" suggested by Nanis. As amended, the present claims address the problems caused by the Beilby layer, and nothing about the prior Nanis patent suggests that the claimed process can be applied to super smooth, cold-worked metals to overcome problems caused by the Beilby layer, in particular to prevent the "carpeting" effect described in the specification. According to the claims as amended, by applying the invention, the electroless nickel alloy plating step results in a nickel alloy surface layer at completion of the electroless plating that has a surface roughness essentially unchanged over the surface roughness of a cold-worked metal starting substrate. Any necessary following polishing steps in preparation for applying a magnetic layer are thereby significantly reduced, and the manufacturing costs for the disk are reduced.

Suenaga et al. describe attempts to use smooth titanium as a base layer for deposition of Ni-P. Suenaga et al. achieves mixed results, as shown by review for example of its Table IV, where more often than not, the finished substrates suffered unacceptable levels of exfoliation. So, in fact, rather than suggesting that smooth titanium is a suitable substrate for magnetic disks, Suenaga et al. appears to teach that titanium is in fact problematic, and merely reports the results of exploring the problems of adhesion between the Ni-P and titanium. Furthermore, Suenaga et al. does not describe surface roughness of the as-plated Ni-P layer, except to indicate whether it has a surface roughness Ra less than 60 Angstroms in Table 1 (see, Suenaga et al., column 6, lines 5-7). The presence or not of the carpeting effect, or other problems cause by the Beilby layer, is not discussed by Suenaga et al. Therefore, it does not provide motivation to combine the Nanis process, directed to less expensive alloys, with the smooth titanium of Suenaga et al. as a means of addressing issues caused by the Beilby layer.

Accordingly, reconsideration of the rejection of claims 1, 4-7, 10, 13, 14 and 33-34, as amended is respectfully requested.

Rejection of Claim 3 under 35 U.S.C. 103(a)

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Nanis in view of Suenaga et al. as applied to claims 1, 4-7, 10, 13, 14 and 32-34, and further in view of Ross et al. (U.S. Pat. 5,980,997). Claim 3 depends from claim 1, as amended, and is believed to be allowable for at least the same reasons.

Furthermore, as argued in response to the last action, Ross et al. is primarily concerned with adding a laser texturable layer to a glass substrate, and describes three variations of

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processes to accomplish this purpose. Other than the comment that the glass substrate be polished and initially smooth, there is no discussion in Ross et al. of average surface roughness, nor of chemical and mechanical variations of the glass substrate. (See, Ross et al., column 3, lines 50-51 and column 8, line 22). Ross et al. does not provide motivation to apply the Nanis process to mask the Beilby layer on a metal substrate, as described above.

Accordingly, reconsideration of rejected claim 3 is respectfully requested, in view of the amendments to claim 1.

Rejection of Claims 1, 2 and 8 under 35 U.S.C. 103(a)

Claims 1, 2 and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nanis (U.S. Pat. 5,405,646) in view of Ishitobi et al. (U.S. Pat. 6,152,976).

As mentioned above, the prior Nanis patent fails to recognize that the process described therein is advantageously applied to cold-worked surfaces of metal substrates to overcome problems of the Beilby layer.

Ishitobi et al. is directed to polishing a substrate that already includes the Ni-P layer. See, column 1, lines 19-24; column 5, line 40-44; and column 7, line 51-54. The Examiner's citation to column 5, lines 34-40, is taken out of context. When the Ishitobi et al. reference is considered as a whole, it is clear that it teaches polishing after plating of the Ni-P layer, and therefore is not relevant to the present invention.

Accordingly, reconsideration of rejected claims 1, 2 and 8 on this ground is respectfully requested, in view of the amendments.

New Claim 35

Applicant has added new claim 35, in view of the clarifying amendments to claim 6.

CONCLUSION

It is respectfully submitted that this application is now in condition for allowance, and such action is respectfully requested.

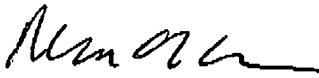
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The Commissioner is hereby authorized to charge any fee determined to be due in connection with this communication, or credit any overpayment, to our Deposit Account No. 50-0869 (NANS 1000-2).

Respectfully submitted,

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